



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/523,345

10/11/2005

Anke Althoff

14219-074US1/P2002,0642

5755

26161

7590

01/30/2008

FISH & RICHARDSON PC

P.O. BOX 1022

MINNEAPOLIS, MN 55440-1022

EXAMINER

KEMMERLE III, RUSSELL J

ART UNIT

PAPER NUMBER

1791

MAIL DATE

DELIVERY MODE

01/30/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/523,345	Applicant(s) ALTHOFF ET AL.	
	Examiner Russell J. Kemmerle	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

Claims 12 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "substantially constant" in claim 12 is a relative term which renders the claim indefinite. The term "substantially constant" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention, since it is unclear how constant the temperature change would have to be in order to be "substantially constant". Claim 13 is rejected as depending from claim 12.

Applicant argues that the term "substantially" appears in countless issued patent claims and has been upheld as not indefinite by the Federal Circuit, citing *Andrew Corp v. Gabriel Electronics*. The fact that the term "substantially" appears in issued patent claims is irrelevant to the current case, as indefiniteness is determined on a case by case basis, and simply because it has been used in other patents does not make it proper in the current case. The Federal Circuit has not said (including in *Andrew Corp v. Gabriel Electronics*) that the term "substantially" is *per se* not indefinite, but has said that the term is not indefinite when the specification in general contains guidelines such

to make the limitation definite (*see In re Mattison*), or that one of ordinary skill in the art would know what was meant by the limitation (*Andrew Corp v. Gabriel Electronics*).

In the instant case, there is no guidance provided by the specification, when taken as a whole, which would allow one of ordinary skill in the art to understand what the limitation "substantially" meant in the context of claim 12. Similarly, there is no evidence that one of ordinary skill in the art would understand what was meant by a "substantially constant rate" without any guidance from the applicant as to what is intended. Therefore, the rejection of claims 12 and 13 under 35 U.S.C. 112 is not withdrawn at this time.

Claim Rejections - 35 USC § 102

Claims 1, 2, 5-7 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Herron (US Patent 4,627,160).

Herron discloses a method of making a laminated ceramic substrate where a plurality of ceramic green sheets are laminated together, and subsequently fired. Herron discloses that the firing process involves several heating steps, including preheating to 200°C in a nitrogen environment, further heating to 450°C in a hydrogen/water environment, continuing to 785°C, and finally sintering in a nitrogen environment at 965°C to sinter the substrates (see Examples I and II, Col 5 line 51 – Col 6 line 68). Herron specifically states that in heating to the sintering temperature there is no prior cooling of the sample (Col 6 lines 55-57). It should be noted that all heating steps described above are carried out in an inert atmosphere

Herron further discloses an example where the layers of the ceramic substrate is made of different ceramic materials (see, Example 1, Col 5 line 51-Col 6 line 46, specifically Col 6 lines 16-22).

Herron further discloses that in forming the laminated stack via holes are opened in the ceramic green sheets, and that those holes are filled with an electrically conductive (i.e., metalliferous) paste, and that the paste is also used to form line patterns on the surface of the sheets (Claim 15).

It would be inherent that these layers would possess the relative sintering temperatures as recited in claim 5.

Herron discloses that between these stratified layers, a materialization layer (i.e., an in line pattern) can be formed (see Claim 15).

Thus, Herron discloses every limitation of claims 1, 2, 4, 5 and 7-9, and thus anticipates the claims.

Claim Rejections - 35 USC § 103

Claim 6 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Herron.

Herron is relied upon as discussed above, but does not specifically discuss the relative permittivity, ϵ , of the materials used. Since applicant does not disclose specific materials which would result in ϵ values such as those recited in claim 6, it is assumed that the recited values are common to those materials known to be used to form ceramic substrates, and would thus be anticipated by examples given by Herron. In the alternative, since applicant does not disclose specific materials which would result in ϵ

values such as those recited in claim 6, it is assumed that one of ordinary skill in the art would know what materials would result in such an ϵ value, and it would therefore be obvious to one of ordinary skill in the art to modify Herron by using materials would produce the relative permittivity values recited in claim 6.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herron in view of Nakatani (US Patent 5,252,519).

Herron is relied upon as discussed above, but teaches that the electrically conductive paste to be used be a copper compound, and does not teach the use of a silver or silver-palladium containing paste.

Nakatani discloses a method for making a stacked ceramic substrate substantially similar to that of Herron. Nakatani discloses that the metal conductor paste used could include, among others, a silver-palladium mixture (Col 1 lines 26-28).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant to have modified the method of Herron as discussed above by using a silver-palladium paste as the metallic conductor as taught by Nakatani instead of the copper compound taught by Herron. This would have been obvious because Nakatani discloses that such a paste is effective as a material for such use, and the advantageous electrical properties of silver-palladium are well known to those in the art.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herron in view of Harada (US Published Application 2001/0,022,416)

Herron is relied upon as discussed above but does not teach that the heating process occurs in air.

Harada discloses a method of making a ceramic substrate, substantially similar to that of Herron. Harada further teaches that the heating processes for debinding and sintering are carried out in air (Page 3 paragraph 45) (it is assumed that since no firing environment is described that an air environment is used, since any other special environment would be affirmatively disclosed).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the method taught by Herron of firing the ceramic substrate in an inert environment by firing in air as taught by Harada. This would be obvious because Harada discloses that such an environment is effective for firing, and an air environment is cheaper and easier to achieve than an inert environment since nothing has to be added to the firing environment.

Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herron in view of Harada and Tamhankar (US Patent 5,230,846)

Herron and Harada are relied upon as discussed above, but fails to teach that during debinding the environment is switched from inert to air (specifically the special case as recited in claim 13), or the firing cycle recited in claim 12).

Herron discloses the benefits of debinding in an inert environment, while Harada discloses the benefits of sintering in an air environment (as discussed above). However, they do not discuss starting with an inert environment of Herron, and switching to the air environment of Harada, specifically performing this switch during a reduction in the temperature from the maximum debinding temperature to a lower temperature that is equal to or greater than the starting debinding temperature.

Tamhankar discloses a method of firing a ceramic substrate substantially similar to that of Herron and Harada. Tamhankar discloses that during the firing cycle a first temperature is reached where debinding begins (T_{E1} , around 200°C), firing and debinding is then continued up to 500°C in a nitrogen/oxygen/water vapor environment. After a hold at 500°C (T_{E2}), the temperature is reduced to 485°C ($T_{E1'}$) while the firing environment is changed, during this time the environment is nitrogen/hydrogen/water vapor. Firing is then continued (with the temperature never dropping below T_{E1} , 200°C) to a sintering temperature in a nitrogen/water vapor environment (Fig 1).

It would have been obvious to one of ordinary skill in the art to modify the method taught by Herron of firing in an inert environment, by changing the environment after debinding to an air environment, since as taught by Harada an inert environment is not required after the debinding is completed and an air environment would be cheaper and easier to fire it. It would be further obvious that the change in environment could be accomplished by the method taught by Tamhankar, which teaches an effective method of transitioning from one environment to another during firing without a substantial reduction in temperature at any point during the firing cycle.

Response to Arguments

Applicant's arguments filed 28 November 2007 have been fully considered but they are not persuasive.

Applicant argued that the rejection of claims 12 and 13 under 35 U.S.C. 112 was improper. This argument was addressed above under the 112 heading.

Applicant argues that Herron fails to teach or suggest that at least two of the layers comprise different ceramic materials (original claim 4, now incorporated into claim 1). Applicant argues that the portion of Herron cited by the Examiner (Example 1, Col 5 line 52 – Col 6 line 46) teaches a Cu based catalyst for removing a binder is added to a glass ceramic material, and that several layers of the glass ceramic are assembled, with and without the catalyst. Applicant argues that both layers of Herron (the catalyzed and uncatalyzed) use the same glass ceramic material, and therefore fail to meet the claim limitation.

However, the Cu based catalyst added to some of the sheets in example 1 is specifically mentioned as copper oxide (Cu_2O), which is a ceramic material. Therefore the catalyzed and uncatalyzed layers of example 1 would comprise different ceramic materials, since some layers would be just the glass ceramic, and other layers would be the glass ceramic plus the copper oxide. Thus, Herron is deemed to meet the claim limitation, and the rejection is not withdrawn.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell J. Kemmerle whose telephone number is 571-272-6509. The examiner can normally be reached on Monday through Friday, 8:30-4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RJK/


STEVEN P. GRIFFIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700